multiplications and divisions are involved is not the one stated above, but the following:

All multiplications are to be performed first and the divisions next.

That is, $9a^2 \div 3a = 3a$ and not $3a^3$.

The multiplications may be taken in any order, but the divisions are to be taken in the order in which they occur from left to right.

That is, the associative law holds for the former but not for the latter.

Thus, $3 \times 5 \times 2 = (3 \times 5) \times 2$ or $= 3 \times (5 \times 2)$; but, $16 \div 4 \div 2 = (16 \div 4) \div 2$ and does not $= 16 \div (4 \div 2)$.

Compare the corresponding rules for addition and subtraction in § 1.

Mathematical Idioms. It might be agreed that, for the sake of simplicity and logical coherence, the past tense of the verb *to drink* should be *drinked*, but even so, English speaking people would continue to say *drank*, and not drinked. Precisely, for the same reason, all who know anything about the language of algebra regard $9a^2 \div 3a$ as equal to $3a$ and not $3a^3$, and, therefore, the rule just given is the correct one as determined by actual usage. When a mode of expression has become wide-spread, one may not change it at will. It is the business of the lexicographer and grammarian to record, not what he may think an expression should mean (no matter how far-fetched the usual or idiomatic usage may seem), but what it is *actually understood to mean by those who use it.* The language of algebra contains certain idioms and in formulating the grammar of this language we must note them. For example, that $9a^2 \div 3a$ is understood to mean $3a$ and not $3a^3$ is such an idiom. The matter is not logical but historical.

II. RELATING TO AN EXTENSION OF WILSON'S THEOREM.

BY ELIZABETH BROWN DAVIS, U. S. Naval Observatory.

From Wilson's theorem we have the congruence,

$$(p-1)!+1 \equiv 0, \quad (\text{mod. } p),$$

which may be written,

$$(1) \qquad (p-1)(p-2)!+1 \equiv 0, \quad (\text{mod. } p).$$

Subtracting (1) from $p(p-2)! \equiv 0$, (mod. p), we have

$$(p-2)!-1 \equiv 0, \quad (\text{mod. } p).$$

This may be written

$$(2) \qquad (p-2)(p-3)!-1 \equiv 0, \quad (\text{mod. } p).$$

Subtracting (2) from $p(p-3)! \equiv 0$, (mod. p), we have

$$2(p-3)!+1 \equiv 0, \quad (\text{mod. } p),$$

or

$$2(p-3)(p-4)!+1 \equiv 0, \quad (\text{mod. } p). \tag{3}$$

Subtracting (3) from $2p\,(p-4)! \equiv 0, \quad (\text{mod. } p)$, we have

$$3!(p-4)!-1 \equiv 0, \quad (\text{mod. } p).$$

Proceeding in like manner, we obtain successively,

$$4!(p-5)!+1 \equiv 0, \quad (\text{mod. } p),$$

$$5!(p-6)!-1 \equiv 0, \quad (\text{mod. } p),$$

$$\cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot$$

$$\left(\frac{p-1}{2}\right)!\left(\frac{p-1}{2}\right)! \pm 1 \equiv 0 \quad (\text{mod. } p),$$

the constant term being $+1$ when $(p-1)/2$ is even and -1 when $(p-1)/2$ is odd. Hence the theorem:

If p is prime, and a is any integer less than $p-1$, then

$$a!(p-1-a)!+(-1)^a \equiv 0, \quad (\text{mod. } p).$$

Wilson's theorem is the special case $a=0$, of which the above is the more general form, it being understood that $0! = 1!/1 = 1$, and that

$$(-1)^0 = (-1)^1/(-1) = +1.$$

NOTES AND NEWS.

Edited by D. A. Rothrock, Indiana University, Bloomington, Indiana.

At the College of the City of New York, Dr. P. H. Linehan has been promoted to an assistant professorship of mathematics.

Dr. Cora B. Hennel has been promoted from an instructorship to an assistant professorship of mathematics at Indiana University.

Dr. Daniel Buchanan has been made professor of mathematics and astronomy at Queen's University, Kingston, Ontario.

Professor H. L. Rietz, of the University of Illinois, has been appointed a member of the joint committee of the American Association of University Professors with the trustees of the Carnegie Foundation for the Advancement of Teaching to report upon the proposed changes in the scope of the foundation.